1999; 60/149,938, filed August 19, 1999; 60/152,677, filed September 7, 1999; 60/154,068, filed September 14, 1999; 60/160,445, filed October 19, 1999; and 60/175,372, filed January 10, 2000, and is a continuation-in-part of U.S. Application No. 09/392,074, filed September 8, 1999, now abandoned, which in turn is a continuation of U.S. Application No. 09/039,150, filed March 13, 1998, now abandoned, which in turn claims the benefit of U.S. Provisional Application No. 60/040,556, filed March 13, 1997.

A1 c-1

The paragraph beginning at page 4, line 12, has been amended as follows:

The aforementioned PCT application PCT/US01/45146, filed November 28, 2001, attorney docket No. CRSL-1-18064, is herein expressly incorporated by reference. Referring now to FIGURE 1, a method for sanitizing perishable goods, including beef, is illustrated. As used in the present invention, sanitizer refers to an agent which will reduce pathogens and microorganisms to insignificant levels. In one instance, this may include the standard set forth in AOAC 4.020-4.029 (1984). Those chemicals which, at recommended concentration, produce 99.999% kill of 75-125 million *E. coli* (ATCC 1129) and 75-125 million *S. aureus* (ATCC 6538) within 30 seconds at 70-75°F are considered satisfactory for purpose of using them in the present invention and can be called sanitizers. However, it is to appreciated that as standards change, the sanitizer used in the present invention, can likewise change accordingly. Furthermore, it is to be appreciated that the method and apparatus may not meet the level of sanitizing as per the definition above. In fact, with food items, it may not be likely that such a high kill rate would be achieved. The present invention provides a substantial reduction of the bacteria population in goods, therefore as used herein "sanitizing" refers to a substantial reduction of the bacteria population, as well as include the kill ratio described.

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The paragraph beginning at page 6, line 21, has been amended as follows:

Referring still to FIGURE 1, in one particular embodiment a third mixing block 124 and a third separating block 126 can follow the second separating block 112. This is useful if for example an antioxidant is to be introduced to mix with and contact surfaces of the perishable good. Suitable antioxidants, and their effects have been described in the aforementioned PCT application and will not be repeated here. Third mixing block 124 receives perishable good 122 from the second separating block 112. Third mixing block 124 is also charged with a third antioxidizing fluid 128 into the mixing block 124. Mixing block 124 includes a means for mixing perishable good 122 with fluid 128. Mixing block 124 is followed by a third separating block 126 for separating the spent antioxidant fluid 130 from the perishable good 122. The spent antioxidant fluid 130 can be recycled to the incoming fresh antioxidant fluid 128 via line 132.

A3

The paragraph beginning at page 7, line 21, has been amended as follows:

Referring still to FIGURE 2, the interior of the section 206 includes a rotating shaft 214 with means for mixing the boneless beef 202 with the ozonated water 208, wherein the mixing means are provided in the form of a plurality of outwardly extending radial impellors fixed to the central rotating shaft 214. In one particular embodiment, the profile of the mixing section tapers from entry to exit so as to provide for forward movement of the beef as well as mix the beef with the fluid 208. One particular aspect of the invention is to provide for the separation of spent or reacted sanitizing fluid from the beef 202 and discharge the spent fluid 216 through an exit port 215. In one particular embodiment, paddles fixed to the rotating shaft 214 are spaced closer together the further the boneless beef travels through the mixing chamber section 206. In this manner, as the boneless beef approaches the separating portion, the closer spacing of the paddles acts to compress the beef and squeeze the sanitizing fluid through perforations 218 of an interior

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wall 220 of the apparatus. Perforations 218 provided on the interior wall 220 of the separating portion of the apparatus empties into a space 224 enclosed by the apparatus exterior wall. Thus, interior wall 220 with perforations separates the beef processing space from a substantially beef free space 224. Small amounts of beef blood and "crumbs" may pass through certain of the perforations. Perforations 218 may be provided around the entire circumference of the interior wall 220 of the separating portion. The space 224 is thusly connected to the spent fluid exit 215 through which spent sanitizing fluid 216 is discharged. A transition portion 207 connects the first 206 and second sections 226, and transfers beef 202 therethrough. Transition portions similarly include a screw or otherwise to transfer the beef from section to section.

A4 c'd

The paragraph beginning at page 8, line 11, has been amended as follows:

In one particular embodiment, the apparatus according to the invention also includes a second chamber section 226 for mixing any suitable neutralizing fluid 228 with the perishable good 202 to, in one instance, substantially rid the good 202 of any residual oxidizing agent, (or, in some instances, allow a measured amount to remain) if used in the sanitizing fluid 208. The second neutralizing chamber section 226 is similar in operation to the first chamber section 206 and includes a rotating shaft 230 centrally disposed in the chamber. In one embodiment, shaft 230 can be connected to the rotating shaft 214 of the first mixing chamber section 206, or shafts 230 and 214 can be independently controlled via independent variable speed drivers. Beef or any other perishable item 202 is transferred into the second chamber portion 226 from the first chamber portion 206 by any suitable means. In one particular embodiment, means for transferring boneless beef from the first chamber 206 into the second chamber 226 includes a helical screw similarly attached to shaft 214 or shaft 230 at the transition section between the first and the second chamber sections 206 and 226. The second chamber section 226 similarly

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A5 a-d includes an annular slot 240 about the circumference of the second chamber 226 for the introduction of the neutralizing fluid 228.

The paragraph beginning at page 11, line 25, has been amended as follows:

Referring to FIGURE 4, the boneless beef enters the conduit in the direction of the arrow indicated by reference numeral 406. The sanitizing fluid 408 enters via the entry port 410. A slot 412 can be provided around the circumference of the vessel to introduce the sanitizing agent 408 at all points around the vessel. The conduit is equipped with a rotating shaft 414 to which means for mixing and/or compressing the boneless beef are attached thereto. The interior shaft 414 is connected to a variable speed drive 416 to control the speed and rate of processing of the boneless beef. In one particular aspect, paddles 418 are attached to the rotating shaft 414 at a mixing portion to mix surfaces of the boneless beef with the sanitizing agent so as to ensure that substantially all surfaces are exposed and contacted by the fluid. In one instance, the paddles may be closer spaced to each other as the paddles are nearer to the separating portion of the chamber 400. The separating portion of the chamber section 400 includes an interior wall 420 A-6 having perforations, wherein the perforations lead to a space. The wall 420 separates the beef processing space from a substantially beef free space that connects to a discharge port. The separating portion of section 400 can extend to an interior conduit 422 of constant dimension and also having perforations. The perforations allow spent fluid to pass from the beef space into a segregated substantially beef free space connected to an exit port 424, where the spent fluid 426 is discharged. In part of the separating portion where the constant diameter conduit 422 is located, the shaft 414 can be fitted with a spiral screw of increasing cylinder dimension so as to compress the beef passing therethrough against the perforations and thusly squeeze out the sanitizing fluid from the beef and also inhibit ingress of fluid from the adjacent section. The

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narrower interior conduit 428 may continue without perforations into the next section 402 thusly acting as a transition portion between sections 400 and 402 and transferring beef from section 400 to section 402. A dividing interior wall divides the section 400 with the section 402 at the separating portion. The section of conduit 428 feeds boneless beef to section 402, wherein it is mixed with a neutralizing fluid 430. Similarly, the neutralizing fluid 430 can be introduced into an annular slot 432 provided about the circumference of the vessel. The shaft 434 of the second section 402 can be continuous with the first shaft 414 or it can be independently driven. The rotating shaft 434 of the second section contains paddles and or spiral screws (augers), depending on whether mixing or separating is taking place at the appropriate portion of the shaft 434. Similarly, a separating portion is formed at the section 402 to separate the spent neutralizing fluid 436 from the beef. The separated fluid 436 exits from port 438. A transfer section 440, without perforations, is provided at the interface of the section 402 with section 404, and includes a screw as described above for transferring beef from one processing section into the next.

A6 c-d

The paragraph beginning at page 13, ~~line 23~~, has been amended as follows:

Referring again to FIGURE 4, the first selected sanitizing fluid 408 may be any suitable bactericide, such as a mixture of ozone and water. The fluid 408 is pumped into the first section 400 at a selected rate and in such a manner so as to clearly contact substantially all surfaces of the boneless beef 406. The quantities and velocity of the boneless beef 406 and the first fluid 408 transferred into the first section 400 are independently varied according to any factors such as bacterial loading on the boneless beef surfaces. For example, the quantity of the first fluid 408 may be proportionately several times or alternatively less than that of the boneless beef transferred into and out of the first section 400 on a weight basis. In one instance, the

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apparatus of the invention can process up to 20,000 lbs/min. However, this is not intended to limit the invention, the rate of 20,000 lbs/min being merely one example of the present invention. Ozonated water is provided by mixing an ozone containing stream of up to 16% ozone with a stream of water. The ozone stream may include nitrogen, air, or any gas thereof mixed with ozone. The mixture is then injected or bubbled into the water to achieve the desired ozone concentration. Without limitation, for an ozone stream concentration of 16% or less, the flowrate of the fluid 408 can be about one-half to five times that of the flowrate of the beef. However, the flowrate can be any proportion in between. However, other flowrates below and beyond that described herein can be used to practice the present invention. The range herein described being merely an example of one embodiment. Sometimes, the flowrate of ozonated water can be less than one-half of the beef flowrate and the flowrate of ozonated water can be more than five times the rate of the beef flowrate. The optimum flowrate depends on many variables, including the ultimate concentration of the ozonated water and the bacteria loading. The bacteria loading may be experimentally determined. In one particular embodiment, the sanitizing agent 408 can include hydrogen peroxide. Further sanitizing agents are described in the aforementioned PCT application.

A7 c'd

The paragraph beginning at page 15, line ~~13~~, has been amended as follows:

After treatment by antioxidants, the beef can be transferred into a vessel in which the beef is retained for a period of time such as less than five minutes to about thirty minutes. The beef may be treated with carbon dioxide in this vessel to ensure removal of substantially all oxygen created as by-products of the ozonated water. The beef is then transferred from the storage vessel and passed through a water washing treatment which can use a processing section similar to any of the processing sections described above so as to substantially remove part or all of the

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